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EXAMINER	
KISS, ERIC B	

ART UNIT	PAPER NUMBER
2192	

DATE MAILED: 05/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/825,007	BERG ET AL.	
	Examiner	Art Unit	
	Eric B. Kiss	2192	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 February 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 February 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *20060218*
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The reply filed 7 February 2006 has been received and entered. Claims 1-22 are pending.

Information Disclosure Statement

2. The HAUGH and SHANKAR references cited in the Information Disclosure Statement filed 10 February 2006 were already cited by the examiner with the previous Office action.

Response to Amendment

3. Applicant's replacement drawings and amendments to the specification appropriately address the objections to the drawings and specification as detailed in the previous Office action. Accordingly, these objections are withdrawn.

4. Applicant's amendment to claim 11 appropriately addresses the objection to claim 11 as detailed in the previous Office action. Accordingly, this objection is withdrawn.

5. Applicant's amendment to claim 17 appropriately addresses the rejection of claim 17 under 35 U.S.C. § 112, second paragraph, as detailed in the previous Office action. Accordingly, this rejection is withdrawn.

6. Applicant's amendments to claims 1-17 do not appropriately address the rejection of claims 1-17 under 35 U.S.C. § 101. Accordingly, this rejection is maintained as set forth below.

Response to Arguments

7. Applicant's arguments filed 7 February 2006 have been fully considered but they are not persuasive.

It is noted that, contrary to Applicant's assertion (Remarks at pp. 9-10), the claims have not been amended to include *the generation of a report which ranks the vulnerabilities as a function of the analysis.*

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., the use of compiler techniques, as opposed to constraint language and formal methods; and the method/utility not being part of the compiler for the program that is being analyzed) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Applicant's arguments with regard to claims 1, 15, and 16 fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

The merits of new claims 18-22 are addressed separately as set forth below.

Claim Rejections - 35 USC § 101

8. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

9. Claims 1-20 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

A claim that requires one or more acts to be performed defines a process. However, not all processes are statutory under 35 U.S.C. § 101. To be statutory, a claimed process must either: (A) result in a physical transformation for which a practical

application is either disclosed in the specification or would have been known to a skilled artisan, or (B) be limited to a practical application which produces a useful, tangible, and concrete result. *See Diamond v. Diehr*, 450 U.S. 175, 183-84, 209 USPQ 1, 9 (1981) (quoting *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876)) ("A [statutory] process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing . . . . The process requires that certain things should be done with certain substances, and in a certain order; but the tools to be used in doing this may be of secondary consequence."). *See also In re Alappat*, 33 F.3d 1526, 1543, 31 USPQ2d 1545, 1556-57 (quoting *Diehr*, 450 U.S. at 192, [209 USPQ at 10]).

In *State Street*, the Federal Circuit examined some of its prior section 101 cases, observing that the claimed inventions in those cases were each for a "practical application of an abstract idea" because the elements of the invention operated to produce a "useful, concrete and tangible result." *State St. Bank & Trust v. Signature Fin. Group*, 149 F.3d 1368, 1373-74, 47 USPQ2d 1596, 1601-02 (Fed Cir. 1998). For example, the court in *State Street* noted that the claimed invention in *Alappat* "constituted a practical application of an abstract idea (a mathematical algorithm, formula, or calculation), because it produced 'a useful, concrete and tangible result'—the smooth waveform." *Id.* Similarly, the claimed invention in *Arrhythmia* "constituted a practical application of an abstract idea (a mathematical algorithm, formula, or calculation), because it corresponded to a useful, concrete and tangible thing—the condition of a patient's heart." *Id.* (citing *Arrhythmia Research Tech. V. Corazonix Corp.*, 958 F.2d 1053, 22 USPQ2d 1033 (Fed. Cir. 1992)).

In determining whether the claim is for a "practical application," the focus is not on whether the steps taken to achieve a particular result are useful, tangible and concrete, but rather that the final result is "useful, tangible and concrete." The Federal Circuit further ruled that it is of little relevance whether a claim is directed to a machine or process for the purpose of a § 101 analysis. *AT&T Corp. v. Excel Commc'ns*, 172 F.3d 1352, 1358, 50 USPQ2d 1447, 1451 (Fed. Cir. 1999).

Data structures not claimed as embodied in computer-readable media are descriptive material *per se* and are not statutory because they are not capable of causing functional change in the computer. *See, e.g., In re Warmerdam*, 33 F.3d 1354, 1361, 31 USPQ2d 1754, 1760 (claim to a data structure per se held nonstatutory). Such claimed data structures do not define any structural and functional interrelationships between the data structure and other claimed aspects of the invention which permit the data structure's functionality to be realized. In contrast, a claimed computer-readable medium encoded with a data structure defines structural and functional interrelationships between the data structure and the computer software and hardware components which permit the data structure's functionality to be realized, and is thus statutory.

Similarly, computer programs claimed as computer listings per se, *i.e.*, the descriptions or expressions of the programs, are not physical "things." They are neither computer components nor statutory processes, as they are not "acts" being performed. Such claimed computer programs do not define any structural and functional interrelationships between the computer program and other claimed elements of a computer which permit the computer program's functionality to be realized. In contrast, a claimed computer-readable medium encoded with a computer program is a computer

element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. *See In re Lowry*, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035.

With regard to claims 1-15 and 18-21, the addition of the words "computer implemented" to the first line of each claim is insufficient to render the claims statutory processes eligible for patent protection because the qualifier "computer implemented" does not imply a practical application which produces a useful, tangible, and concrete result. Further, the generation of a report that identifies vulnerabilities is insufficient to define a practical application because the report is not a tangible result.

With regard to claims 16, 17, and 22, these claims recite descriptive material, *per se*. These claims do not define the structural and functional interrelationships between the recited elements and other aspects of a computer system that would permit the functionality to be realized. Claims 16, 17, and 22 are not, for example, recited as computer-readable media encoded with executable instructions for carrying out the recited functionality (which would be statutory).

Claim Rejections - 35 USC § 112

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 1-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Applicant has amended independent claims 1 and 15 to recite, "a pre-existing source code listing, stored in computer readable medium having computer executable instructions, said source code having an inherent control flow and an inherent data flow during the computer execution thereof . . . ." Because a source code listing is typically understood to be a non-executable human-readable document containing program instructions written in a high-level language (as opposed to a computer-executable machine code format), it is unclear what Applicant means by storing such a listing in a medium with computer-executable instructions, and it is likewise unclear what Applicant means by "the computer execution thereof". While source code may be readily converted to a computer-executable format through compilation, it is unclear whether the limitations in the bodies of the claims define acts carried out on non-executable source code, executable machine code (which is not source code), or some combination of the two.

Further, it is unclear what is meant by the phrase "computer-executable variables" in line 6 of claim 1, as variables do not, *per se*, provide executable functionality.

Claim Rejections - 35 USC § 102

12. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

13. Claims 1-16, as best understood, are rejected under 35 U.S.C. 102(b) as being anticipated by David Wagner, et al., "A First Step Towards Automated Detection of Buffer Overrun Vulnerabilites," Proceedings of the Network and Distributed System Security Symposium, Feb. 2000, (hereinafter *Wagner et al.*).

As per claims 1, 15, and 16, *Wagner et al.* discloses analyzing variables in source code in the context of at least one of the inherent control flow and inherent data flow and creating models therefrom in which each model specifies pre-determined characteristics about each variable (see, for example, section 1.1); using the variable models to create models of arguments to routine calls in the source code (see, for example, sections 1.1 and 3); using the argument models in conjunction with pre-specified criteria for the corresponding routine calls to determine whether the routine calls possess vulnerabilities as a consequence of the arguments and known routine behavior (see, for example, sections 1.1 and 4); and generating a report that identifies the vulnerabilities (see, for example, Fig. 5).

As per claim 2, *Wagner et al.* further discloses the models specifying the memory size of a variable (see, for example, sections 1.1 and 3).

As per claim 3, *Wagner et al.* further discloses the models specifying the data size of a variable (see, for example, sections 1.1 and 3).

As per claim 4, *Wagner et al.* further discloses the models specifying whether the variable is a null terminated string or not null terminated string for variables of string value type (see, for example, sections 1.1 and 3).

As per claim 5, *Wagner et al.* further discloses the models specifying the type of memory of a variable (see, for example, sections 1.1 and 3).

As per claim 6, *Wagner et al.* further discloses the models specifying the value of a string for variables that are of a string value type (see, for example, sections 1.1 and 3).

As per claim 7, *Wagner et al.* further discloses the models specifying the origin of the data for a variable (see, for example, sections 1.1 and 3).

As per claim 8, *Wagner et al.* further discloses the models specifying characteristics of variable arguments (see, for example, sections 1.1 and 3).

As per claim 9, *Wagner et al.* further discloses the models specifying characteristics of expression arguments (see, for example, sections 1.1 and 3).

As per claim 10, *Wagner et al.* further discloses the models being specified as lattices (see, for example, sections 2 and 3).

As per claim 11, *Wagner et al.* further discloses the lattice values including at least one of a value to represent no knowledge, a value to represent inconsistent knowledge, and a value to represent a refinement of knowledge (see, for example, sections 2 and 3).

As per claim 12, *Wagner et al.* further discloses the value to represent a refinement of knowledge including values to specify a range of specific values (see, for example, sections 2 and 3).

As per claim 13, *Wagner et al.* further discloses the pre-specified criteria for the corresponding routine including rules about the semantic behavior of the routine (see, for example, sections 1.1 and 3).

As per claim 14, *Wagner et al.* further discloses the vulnerabilities being buffer overflows (see, for example, section 1.1).

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

15. Claims 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Wagner et al.* in view of John Viega, et al., "ITS4: A Static Vulnerability Scanner for C and C++ Code," 2000 (art of record; hereinafter *Viega et al.*).

Regarding claims 17-19, *Wagner et al.* fails to expressly disclose using a database having computer readable information about a predefined set of source code routine calls, said information specifying one or more conditions that present a vulnerability during execution of the routine call; and using the database to retrieve information for a corresponding routine call to check for the specified condition to see whether the routine call presents a vulnerability. However, *Viega et al.* teaches that it is beneficial to use a database of vulnerabilities, including a description of possible problems, hints on how to tell if there really is a problem, and suggested fixes, and to compare a token stream based on source code with the database to detect vulnerabilities (see, for example, sections 2, 4.1, and 4.2). Therefore, it would have been obvious to one of ordinary skill in the computer art at the time the invention was made to use such a database to facilitate the detection of vulnerabilities. One would be motivated to do so to maintain expert knowledge regarding vulnerabilities in a format that can be easily modified.

16. Claims 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Wagner et al.* in view of David Larochelle and David Evans, "Statically Detecting Likely Buffer Overflow Vulnerabilities," 2001 (art of record; hereinafter *Larochelle et al.*).

Regarding claims 18-21, *Wagner et al.* fails to expressly disclose identifying the location in the source code listing where the vulnerability occurred. However, *Wagner et*

al. clearly indicates that such a feature would be desirable (*Wagner et al.* at p. 11), and *Larochelle et al.* teaches providing such vulnerability location information (see, for example, the representative output in section 4.1 of *Larochelle et al.*, describing a vulnerability (possible out-of-bounds store) at line 1112 of source code file *ftpd.c*). Therefore, it would have been obvious to one of ordinary skill in the computer art at the time the invention was made to provide such a vulnerability location feature as taught by *Larochelle et al.* in order to gain the advantage of knowing which statement in a source code file is at fault for a particular vulnerability.

Conclusion

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

18. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Eric B. Kiss whose telephone number is (571) 272-3699.

The Examiner can normally be reached on Tue. - Fri., 7:00 am - 4:30 pm. The Examiner can also be reached on alternate Mondays.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Tuan Dam, can be reached on (571) 272-3695. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Any inquiry of a general nature should be directed to the TC 2100 Group receptionist: 571-272-2100.

EBK /EBK
May 12, 2006

TUAN DAM
SUPERVISORY PATENT EXAMINER